

WHAT IS CLAIMED IS:

1. A method of manufacturing a wear resistant shoe, comprising:

5 cold-heading one end portion of a generally cylindrical blank to radially increase and axially diminish the dimensions of the one end portion, and to work harden the one end portion while leaving an opposite end portion dimensionally unchanged; and

10 subsequently cold-working and thereby hardening the opposite end portion.

2. The method of claim 1, including the additional steps of:

machining the cold-headed blank prior to cold-working to form a hollow skirt in said opposite end portion for receiving a rounded end of a piston rod.

15 3. The method of claim 2, wherein the step of cold-working comprises crimping the skirt about a received piston rounded end, joining the shoe and piston, and work hardening the skirt.

20 4. The method of claim 3, further including the step of machining the one end portion to predetermined final dimensions subsequent to the step of cold-heading and prior to the step of crimping.

5. The method of claim 3, further including the step of machining the cold-headed end portion to form a cam engaging wear resistant surface.

25 6. The method of claim 5, further including the step of surface hardening the machined cam engaging surface.

7. The method of claim 6, wherein the step of surface hardening comprises application of a TiN material.

8. A wear resistant shoe manufactured according to the process of claim 1.

30 9. The method of claim 1, wherein the cylindrical blank comprises an alloy of cobalt

PENDING PCT/US2013/053050

10. A method of manufacturing a wear resistant shoe, comprising:
work hardening a portion of a cylindrical member to a substantial
depth;
machining the cylindrical member portion to finished dimensions;
5 and
surface hardening a face of the machined cylindrical member
portion.

11. The method of claim 10, including the additional step of
machining another portion of the cylindrical member to form a hollow skirt
10 in said another portion for receiving a rounded end of a piston rod.

12. The method of claim 11, including the further step of crimping
the hollow skirt about the rounded end, the crimping imparting an
increased hardness to the cylindrical member close to the crimp.

13. A wear resistant shoe having a surface hardened face for
15 engaging a cam, a socket for providing a pivotal coupling to a piston rod,
and a work hardened foundation in the face region for providing rigid
support for the surface hardened face.

14. The shoe of claim 13, wherein the socket is crimped around a
rounded portion of a piston and work hardened by the crimping.

20 15. A method of forming and assembling a piston and wear
resistant shoe, the shoe formed from rod stock of a diameter less than the
greatest diameter of the finished shoe, comprising:
upsetting one end portion of the rod stock to axially reduce and
radially increase the dimensions of the one end portion;
25 forming a hollow region in an opposite rod stock end portion; and
crimping the periphery of the hollow region about a rounded end of
the piston rod.

16. The method of claim 15 further comprising the step of work
hardening the one end portion during the upsetting step.

30 17. The method of claim 16 further comprising the step of surface
hardening the upset one end.

18. The method of claim 15 further comprising the step of work hardening the periphery of the hollow region during the step of crimping.

19. A method of forming and assembling a piston and wear resistant shoe, the shoe formed from hardened rod stock, comprising:

5 forming a hollow region in one rod stock end portion;
annealing the one end portion of the rod stock; and
crimping the periphery of the hollow region about a rounded end of
the piston rod.

10 20. The method of claim 19, including the additional step of
machining an opposite end portion of the rod stock to form a cam
engaging wear resistant surface.

21. The method of claim 20, further including the step of surface hardening the machined cam engaging surface.

15 22. The method of claim 19, wherein the step of crimping work
hardens the one end portion.